U.S. DEPARTMENT OF COMMERCE
National Technical Information Service
PB-277 882

A National Environmental/Energy Workforce Assessment. West Virginia

National Field Research Center, Inc, Iowa City, Iowa

Prepared for

Environmental Protection Agency, Washington, D C

Dec 77

PB 277 882

A National Environmental/Energy Workforce Assessment

REPRODUCED BY
NATIONAL TECHNICAL
INFORMATION SERVICE
U. S. DEPARTMENT OF COMMERCE
SPRINGFIELD, VA. 22161

Conducted by:

National Field Research Center, Inc.

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94

TECHNICAL REPORT DATA
(Please read Instructions on the reverse before completing)

1. REPORT NO.	2.	3. RECIPIENT'S ACCESSION NO. PB277882
4. TITLE AND SUBTITLE A NATIONAL ENVIRONMENTAL/ENERGY WORKFORCE ASSESSMENT, West Virginia		5. REPORT DATE December 1977 - Date of Completion 6. PERFORMING ORGANIZATION CODE
7. AUTHOR(S) National Field Research Center, Inc.		8. PERFORMING ORGANIZATION REPORT NO.
9. PERFORMING ORGANIZATION NAME AND ADDRESS National Field Research Center, Inc. P.O. Box 287 Iowa City, Iowa 52240		10. PROGRAM ELEMENT NO. 2BC651 (36) 11. CONTRACT/GRANT NO. Grant #T900591010
12. SPONSORING AGENCY NAME AND ADDRESS U.S. Environmental Protection Agency Office of Federal Activities (A-104) 401 M Street, S.W. Washington, D.C. 20460		13. TYPE OF REPORT AND PERIOD COVERED Phase I Final Report 14. SPONSORING AGENCY CODE

15. SUPPLEMENTARY NOTES Phase II will comprise approximately five volumes and will be available in September 1978. Phase III will be available in September 1979.

16. ABSTRACT

This study is one of 70 volumes assessing the workforce needs (manpower needs) for pollution control and abatement in the United States for the five-year period of 1976 through 1981. Seven fields for pollution control — air, noise, pesticides, potable water, radiation, solid waste, and wastewater — are analyzed, together with energy-related programs currently accentuated by the national effort to solve energy supply problems.

Designed as Phase I of a three-phase program, the complete assessment includes the following volumes: one each for the 50 states, the District of Columbia, Puerto Rico, and the Virgin Islands; one for each of the ten EPA regions; a one-volume National Abstract; a volume on National Legislation; a volume on Business and Industry; and a four-volume National Summary. The information was gathered through extensive personal interviews with responsible federal, state, and local officials in every state; with officials of representative private industrial and commercial firms; and with representatives of national industrial and trade organizations.

Phase II will develop a broad national inventory of the entire range of post-secondary and higher education training offered in the pollution control and energy areas cited above, and Phase III will offer demonstrations for curriculum changes or modifications which appear necessary to assure an adequate and properly trained national environmental/energy workforce.

17. KEY WORDS AND DOCUMENT ANALYSIS

a. DESCRIPTORS		b. IDENTIFIERS/OPEN ENDED TERMS	c. COSATI Field Group
Planning Regional Planning State Planning State Agencies Federal Government Planning Labor Force Manpower Forecasting	Employment Economic Surveys Energy Management Pollution Control Environmental Management Environmental Education Environmental Sciences Conservation Environment	National Environmental/Energy Workforce Assessment	

18. DISTRIBUTION STATEMENT	19. SECURITY CLASS (This Report)	21. NO. OF PAGES
Release Unlimited		94 p.
	20. SECURITY CLASS (This page)	22. PRICE PC A05 MF A01

NATIONAL ENVIRONMENTAL/ENERGY

WORKFORCE ASSESSMENT

for

WEST VIRGINIA

Conducted by:

NATIONAL FIELD RESEARCH CENTER, INC

Under Grant from:

UNITED STATES

ENVIRONMENTAL PROTECTION AGENCY

Grant #T900591010

1977

This document has been reviewed by the Environmental Protection Agency and approved for publication. Approval does not signify that the contents necessarily reflect the views and policies of the Environmental Protection Agency, nor does mention of trade names or commercial products constitute endorsement or recommendation for use.

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ACKNOWLEDGEMENT

Valuable support and assistance for this report was provided by the West Virginia Department of Natural Resources, Department of Health, Department of Agriculture, and the Air Pollution Control Commission. Special thanks is extended to Mr. John Brown of the Division of Sanitary Engineering, Department of Health, for providing valuable insight into water and wastewater training programs in the state.

Appreciation is also extended to Mr. John Hall, Chief of the Division of Water Resources, and Mr. Jerry Ray, Chief of the Surveillance, Analysis and Enforcement Section of the Division of Water Resources, both of the Department of Natural Resources; Mr. Albert Cole, Director of the Bureau of Plant Pest Control of the Department of Agriculture; Mr. Carl Beard, Director of the Air Pollution Control Commission; and Mr. Robert McCall, Director of Environmental Health Services, Department of Health.

Thanks also go to Mr. Donald Kuntz, Chief of the Water Supply Program, Division of Sanitary Engineering, Department of Health; Mr. Jim Rosencrance, Chief of the Laboratory Section, Environmental Health Services, Department of Health; Mr. Grady Bowyer of the Radiological Health Program, Department of Health; Mr. Glen Fortney of Environmental Health Services, Department of Health; Mr. Rod Clay, Deputy Director of the Department of Natural Resources; Mr. Dennis Boyles, Administrative Assistant to the Director of the Department of Natural Resources; and Mr. Nicholas Johnson, Deputy Attorney General of the State of West Virginia.

PREFACE

This report presents existing workforce levels, training programs, and career potentials and develops staffing level projections (1976 - 1981) based on available information for the State of West Virginia in the environmental pollution control areas of air, noise, pesticides, potable water, radiation, solid waste, waste water, and energy. This study was carried out for the United States Environmental Protection Agency by National Field Research Center of Iowa City, Iowa.

The information and data presented in this report were compiled in large part from extensive interviews with professionals working in the respective areas and were supplemented by telephone surveys and research.

FOREWORD

The material herein contains the information and data collected for eight individual pollution control inventories conducted for West Virginia. The format includes workforce profiles, projections, growth and career potential for each of the areas investigated. Growth projections are necessarily based on best professional estimates developed from available information and represent what are felt to be realistic figures by experts in the respective areas. The pollution control areas considered by this study are as follows:

Air

Noise

Pesticides

Potable Water

Radiation

Solid Waste

Wastewater

Energy

National Environmental Energy
Workforce Assessment

Phase I

WEST VIRGINIA

State Summary

I. AIR

In West Virginia, the two most serious pollutants are particulates and sulfur oxides. The largest sources of these pollutants are power generating plants, metallurgical furnaces, and coal and oil fuel burning units.

The West Virginia air pollution control law was enacted in 1961. The law created a separate state agency composed of a seven member commission, known as the West Virginia Air Pollution Control Commission (WVAPCC), to implement the program. Subsequently, West Virginia was divided into ten Air Quality Control Regions (AQCR), four interstate and six intrastate.

The West Virginia Air Pollution Control Commission has a staffing level of 59 persons at present, of which fifteen are classified as engineers. Statewide staffing levels were not available at this writing.

The WVAPCC program officials indicate that staffing levels can be expected to increase to about 100 persons, or a gain of 41, over the next five years. This estimate of increased needs is based in part on the anticipation that U.S. EPA will be requiring the state to regulate additional emissions. The major occupational increase will occur among engineers with only a small demand for those in other occupations. Generally it is believed that engineers with differing specializations will continue to be utilized.

II. NOISE

There is currently no active noise program in the State of West Virginia. The State Department of Health has been delegated authority over noise activities in the state, but there are currently no noise standards to enforce by law. The only existing noise restriction in the state applies to motor vehicle mufflers. Consequently, at present there are no state or local personnel involved in noise control activities.

Workforce projections for noise activities in the state are unapproachable at this time, due to the fact that no noise program exists, and future plans for the establishment of a noise program are as yet undetermined. Noise legislation has been introduced several times but, to date, has failed to be passed by the state. legislature. It is conceivable that with the inception of a noise program in the state at some future date, there would be a demand for personnel with backgrounds in engineering, acoustics, and some sciences, such as physics.

The creation of a program in West Virginia in the future would most likely be contingent upon both the recognition of noise as a real environmental problem on the part of the state legislature, and the availability of federal funds to support the program.

III. PESTICIDES

The West Virginia pesticide control program is the responsibility of the State Department of Agriculture. Within the Department, program responsibilities are divided between the Plant Pest Control Division which has implementation and enforcement activities and the Consumer Protection Division which handles dealer licensing, certification, and pesticides registration.

The current staffing level of West Virginia's pesticide program consists of three people, two of whom are located in the Plant Pest Control Division and one in the Consumer Protection Division. In addition to state program personnel, professionals estimate that there are 2,048 commercial applicators and 28,984 private applicators in the state that must be certified under the law.

Program officials in the Plant Pest Control Division have estimated that the pesticide program must double in staff size in order to do an adequate job. It is estimated that two additional persons would be hired and that they would be employed by 1978. Projections for the applicator category were unavailable at this writing.

Potential for careers in pesticides in West Virginia is anticipated to be very limited over the next five years. The opportunity that does exist is expected to be for professionals with an educational background in the natural sciences.

IV. POTABLE WATER

Responsibility for the administration of the potable water program has been allocated to the Environmental Health Service, West Virginia Department of Health. The program's activities are concerned with the implementation and enforcement of the federal Safe Drinking Water Act (SDWA). The State of West Virginia has assumed primacy under the Act for its implementation and enforcement.

The current staffing level of the potable water program is 24. Statewide workforce figures were unavailable at the time of this writing.

Projected growth in the water supply program is expected to increase significantly over the next five years according to professionals working in the program. The present level is anticipated to increase at a rate of 15 percent per year, which would double the size of the workforce. The largest demand would be for engineers. The future for plant operators and laboratory personnel also seems to hold some promise. Although specific growth figures are not available, new legislation will demand increases in both areas. Generally, operators and laboratory personnel might anticipate a ten percent per annum growth potential.

Projections indicate that careers in potable water in West Virginia will be significant at the state level. Opportunity will be available to engineers, along with some demand for persons with professional training in chemistry and biology.

V. RADIATION

Responsibility for radiation control has been allocated to the Bureau of Industrial Hygiene, Environmental Health Services, State Department of Health.

The radiation program in the State of West Virginia currently is not involved in environmental sampling, and none is anticipated for the future. State personnel conducted some air sampling until two years ago. The program does have monitoring capabilities, but program activities are directed primarily toward medical radiation, including surveys of X-ray equipment.

West Virginia has not entered into an agreement with the Nuclear Regulatory Commission (NRC) whereby certain of the Commission's responsibilities could be assumed by the state. However, state personnel often accompany NRC inspectors on visits to the 131 licensed sites.

There is only one person, a scientist, currently employed in the radiation program at the state level. Statewide staffing figures were unavailable at this writing.

There will be a moderate increase in career opportunities in radiation at the state level over the next five years due to the fact that the program is obliged to commence activities to ensure state compliance with federal regulations. These opportunities will exist for scientists and technicians at the degreed level. There will also be some demand for clerical personnel.

VI. SOLID WASTE

In 1970, West Virginia adopted a state Solid Waste Management Plan. This plan, prepared under a grant from EPA, recommended the concept of regional waste management planning and the need for an autonomous waste management agency. The program is administered within the Environmental Health Service of the State Department of Health.

Program personnel have indicated that landfills are the only feasible method for solid waste disposal at present. It is cheaper than other acceptable disposal methods and West Virginia's population is located mainly in rural areas and small towns which are not likely areas for resource recovery facilities. There are 42 sanitary landfills in the state that meet state standards and have permits. It is estimated that there are an additional 260 open dumps operating without permits.

State level personnel include eight professionals, mostly sanitarians. Although there are no firm figures available, additional workforce in solid waste exists at the community level in landfill operations and waste collection and in the private sector in landfill operations, collection, and resource recovery.

The solid waste program has had a stable workforce level for the past several years. Over the next five years, however, staffing is expected to double.

VII. WASTEWATER

The Division of Water Resources, Department of Natural Resources, administers and enforces the West Virginia water laws to control the pollution of surface and groundwaters. District offices are located in Romney, Nitro, Parkersburg, Fairmont, and Beckley, and a laboratory in Elkins.

The current staffing level of the wastewater program consists of 107 people in the Division of Water Resources. Program officials have indicated that there are about 500 certified wastewater treatment plant operators in West Virginia. Approximately 50% work in municipal sewage plants and 50% in industrial waste treatment. In addition, there are estimated to be about 225 non-certified operators.

Projected growth in the wastewater program is expected to be substantial, about nine percent per annum to 1982. Although exact workforce projections for wastewater treatment plant operators was not available, program officials indicated that there will be an increase possibly at a rate of about 10% per annum over the next five years.

Projections indicate that the potential for careers in wastewater are good in West Virginia. Most of these will require professionally trained persons. Additionally, some opportunities will exist for those who do not have college degrees.

VIII. ENERGY

West Virginia is second to Kentucky in bituminous coal production. The more than 100 million tons produced annually account for 17% of the nation's total coal production. The state is the largest producer of natural gas east of the Mississippi River.

West Virginia's economy has long been dependent upon energy production, especially coal. More than 1,000 mines are operating in 34 of the 38 counties. In addition to the extrusive deep mine operations, more than a quarter of a million acres have been strip mined.

The Fuel and Energy Office was established to:

- provide current information regarding energy availability and distribution;
- act as liaison between citizens, industry and government agencies;
- promote and implement long and short-term energy conservation program;
- provide a public information program to citizens on energy conservation;
- develop educational programs;
- recommend energy legislation;
- forecast possible state energy shortages and develop contingency plans; and,
- administer the fuel allocation program.

STATE OF WEST VIRGINIA - SUMMARY

National Environmental/Energy Workforce Assessment
Pollution Control & Abatement Personnel
Projected Workforce Requirements (1976-1981)

Environmental Area	1976	1977	1978	1979	1980	1981	%/annum growth (average)
AIR[1]	59	66	75	82	91	100	11%
NOISE[2]							N/A
PESTICIDES[3]	3	3	5	6	6	6	17%
POTABLE WATER[4]	22	30	38	44	47	47	15%
RADIATION[5]	1	1	1	4	4	4	60%
SOLID WASTE[6]	8	8	8	9	11	11	8%
WASTEWATER[7]	107	116	125	138	151	165	9%
ENERGY[8]							N/A
TOTALS	202	224	252	283	310	333	11%

[1]The above includes only employees of the West Virginia Air Pollution Control Commission.

[2]No figures are available since there is currently no active noise program.

[3]The above includes state program personnel, but does not include an estimated 2,048 commercial and 28,984 private applicators that must be certified.

[4]The above does not include water supply and water treatment plant operators.

[5]The above includes only state agency personnel.

[6]The above does not include private sector personnel.

[7]The above does not include an estimated 275 wastewater treatment plant operators.

[8]No figures were available at the time of the preparation of this report.

EDUCATION

West Virginia has a limited number of environmental education programs offered by colleges and universities. Two notable programs are those of Glenville State College and Parkersburg Community College.

Glenville State College offers an Associate in Science Degree in Environmental Technology. Courses offered include air quality analysis, water quality analysis, reclamation problems and techniques, solid waste disposal, and environmental planning and development. The Parkersburg Community College has a certificate program in Environmental Engineering Technology. The courses offered include introduction to environmental technology, environmental health, wastewater treatment, air pollution control, and public health and pollution control law.

In addition to the above schools, West Virginia University offers undergraduate courses in air pollution, solid waste disposal, waste treatment, water resources, and radiological health in the civil engeneering program and graduate courses in air pollution, solid waste disposal, waste treatment, water treatment, and radiological health. The Davis & Elkins College in Elkins has an undergraduate program in Ecology and Environmental Science leading to either a B.S. or B.A. degree.

LEGISLATION

The environmental/energy legislation for West Virginia was obtained by request from various agency personnel and through various library references. Summaries of the legislation deemed most relevant to the eight subject areas of the workforce assessment were prepared, and are included in the respective state reports. The following list of laws represents virtually all environmental legislation for the state. Only certain of the following laws were summarized; the list is presented to show, by title, the kinds of laws which have been enacted.

Air Pollution Control Law

Pesticide Use and Application Act of 1975

Pesticide Act of 1961

Roads and Highways Beautification Law

Solid Waste Disposal Law

Solid Waste Authority Act

Water Pollution Control Act

Surface Mining Act

National Environmental Energy
Workforce Assessment

Phase I

WEST VIRGINIA

State Report

STATE PROFILE

West Virginia, with an area of 24,181 square miles, was carved from Virginia and admitted to the Union in 1863. The 1975 estimated population was 1,803,000.

West Virginia suffers from serious economic difficulties. The 1975 per capita income was $4,815; slightly more than $1,000 below the national average. Bituminous coal is the state's greatest economic asset. Mineral production, valued at $2.9 billion annually, equals value added by manufacture. Coal makes up 94% of the annual mineral production value. This equals 17% of the nation's bituminous coal production, placing West Virginia as the second largest producer behind Kentucky. Other minerals extracted include natural gas, petroleum, salt, stone, cement, and lime.

Chemical industries account for 36 percent of the $2.9 billion manufacturing value. Chemicals, including plastics and synthetic fibers, are built on the abundance of salt brine, gas, oil, and coal resources. The larger plants are in the Ohio and Kanawha River Valleys where electrical power is also abundant. Steel, glass, and pottery are produced in large amounts.

The predominance of mountainous terrain restricts agricultural prospects for West Virginia. The Alleghenies run northeast to southwest in the eastern half of the state; the western half is a plateau which slopes to the Ohio River. Farm receipts amounted to $147 million in 1975. Poultry and dairy products, cattle and sheep formed the

largest segments of the total; apples and peaches ranked highest among the crops. Nearly 80 percent of the state is in forest.

Tourism is becoming increasingly important to West Virginia's economy. Visitors now account for more than $480 million annually. The state has more than one million recreational acres in 34 state parks, 9 state forests, and Monongahela, George Washington, and Jefferson National Forests.

WEST VIRGINIA POLLUTION CONTROL AND ABATEMENT AGENCIES

The West Virginia Department of Natural Resources, the State Department of Health, the State Department of Agriculture, and the Air Pollution Control Commission all share responsibility for the state's pollution control and abatement activities.

The Director of the Department of Natural Resources answers directly to the Governor of the state. The Department is composed of the following major divisions: Aviation, Planning and Development, Parks and Recreation, Administration, Law Enforcement, Information and Education, Wildlife Resources, Forestry, Reclamation, and Water Resources.

The Division of Water Resources administers and enforces the state's water laws to control the pollution of surface and ground waters. In accomplishing this task, the Division correlates its activities with various federal, state and local agencies. The Division is comprised of a chief, assistant chief, legal and administrative staff, information representative, Water Resources Board, and four assistant section chiefs.

The Water Resources Board is composed of five members appointed by the Governor. Under state law, the Board is empowered to promulgate rules and regulations setting standards of water quality and effluent limitations for the waters of the state. The Board can also enter into agreements with other state and interstate agencies relating to the control and reduction of water pollution.

The four assistant chiefs control the sections for Permits, Planning, Municipal Grants, and Surveillance, Analysis and Enforcement. The Permits Section is divided into four units: Mine Drainage, Industrial, Municipal (Permits), and Coal Preparation. Its function is to review applications and prepare water pollution control permits, including review of National Pollutant Discharge Elimination System (NPDES) water pollution permits. The permit system is enforced and monitored by the Surveillance, Analysis and Enforcement Branch. Samples of water from the streams and effluents from dischargers are analyzed and the data compiled in the division laboratory in Charleston to assure that all dischargers comply with the Water Pollution Control Act. The Municipal Grants Section administers the U.S. EPA Sewage Treatment Construction Grants Program and is responsible for maintenance and specification review. The Planning Section consists of the units of Water and Related Land Resources, Pollution Control Planning, and Special Projects. Overall pollution control planning for West Virginia is conducted by this section, as well as planning the various responsibilities dictated by the Federal Water Pollution Control Act.

The West Virginia Air Pollution Control Commission is responsible for the state's air pollution control program. The Commission basically oversees the activities of a director and five general divisions: Engineering, Laboratory, Compliance and Air Quality, Meteorology, and Data Processing. Among its more important powers,

the Commission has the authority to adopt regulations, hold hearings, inspect sources of pollution, require sources to install monitoring equipment, establish citizen advisory councils, and accept funds.

The West Virginia State Department of Health encompasses six major divisions: Preventive Medical Services, Disease Control, General Services, Health Statistics, Environmental Health Service, and Maternal and Child Health. The Environmental Health Service is composed of the following units: Sanitary Engineering, General Sanitation, Food Control, Solid Waste, Industrial Health, Occupational Health, and Radiological Health. The Service administers the state's noise, water supply, solid waste, sewage and excreta, and radiation protection programs.

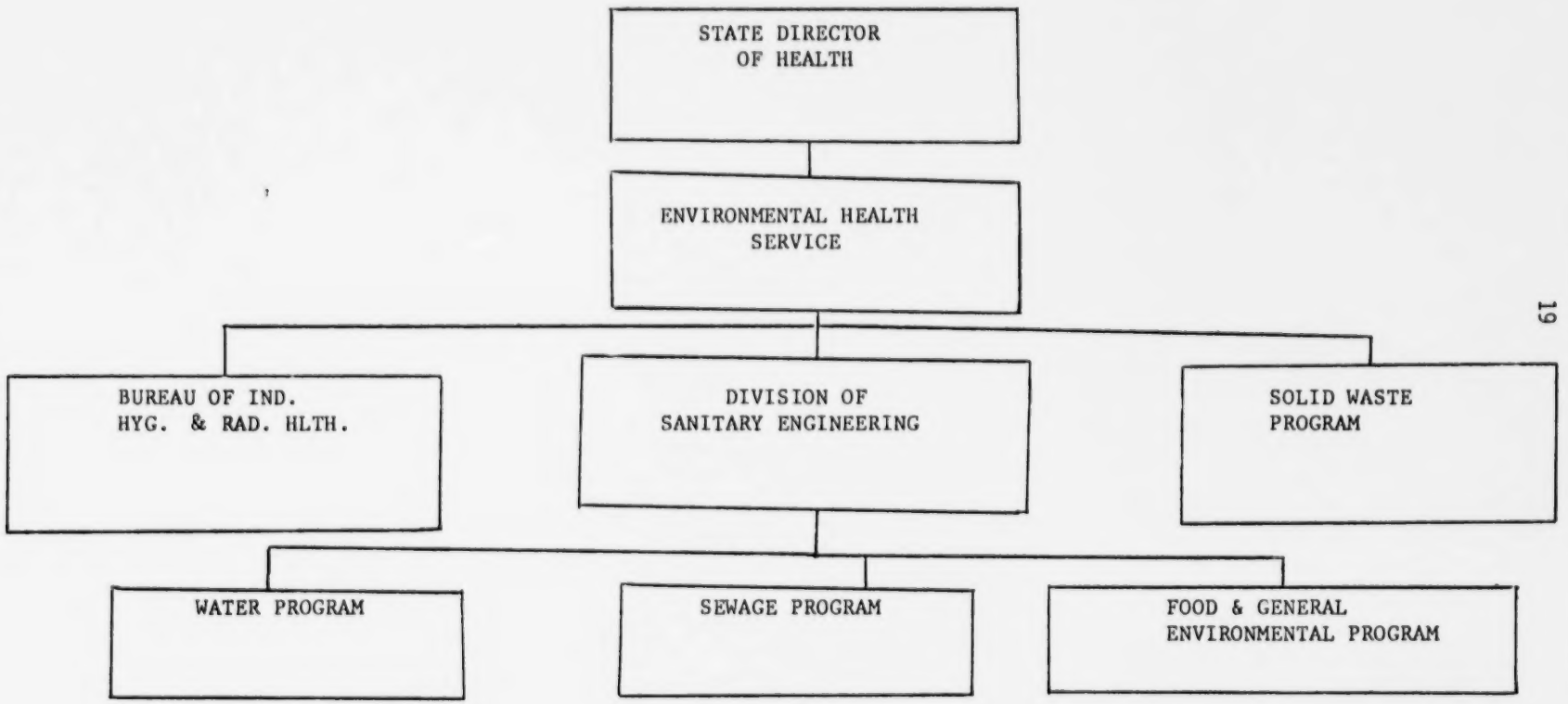
The State Department of Agriculture has sole responsibility for West Virginia's pesticide control program through its Division of Plant Pest Control.

Figure 1

ORGANIZATIONAL CHART

ENVIRONMENTAL HEALTH SERVICE

STATE HEALTH DEPARTMENT



Pollution Control and Abatement Programs

I. AIR

A. Introduction

West Virginia's air pollution control law was enacted in 1961 to provide for a coordinated statewide program of air pollution prevention, abatement and control; to facilitate cooperation across jurisdictional lines in dealing with problems of air pollution not confined within single jurisdictions; and to provide a framework within which all values may be balanced in the public interest. Today these priorities also include the preparation and implementation of a plan for achieving and maintaining and enforcing national primary and secondary ambient air quality standards.

To implement the program, the law created a separate state agency composed of a seven member commission, known as the West Virginia Air Pollution Control Commission (WVAPCC), which includes the State Director of Health, the Commissioner of Agriculture and five members appointed by the Governor, two of whom must be representative of industry. The powers and duties of the Commission include:

1) develop ways and means for regulation and control of air pollution
2) encourage and conduct studies and research relating to air pollution
3) adopt and promulgate rules and regulations
4) encourage voluntary cooperation
5) enter and inspect property to ascertain state of compliance
6) require persons directly or indirectly discharging pollutants to file with the Commission
7) require owners or operators of stationary sources to install monitoring devices as may be prescribed.

Since the approval by the Federal Government of the State's Implementation Plan in late May of 1972, the Commission has continued its efforts toward ensuring that primary and secondary air quality standards will be met throughout West Virginia.

Enforcement of the emission standards as set forth in the Commission's Regulations is the key to attaining and maintaining the air quality standards. All plants in violation of the standards are currently operating under compliance schedules. These phased cleanup schedules must be strictly adhered to under penalty of law. Reports are required to be submitted to the Commission each three months defining the progress in achieving compliance.

The Director is responsible for administering the law and, when he has reason to believe that a person(s) is violating the provisions of the law or any rules and regulations promulgated by the Commission, may make and enter an order directing such person(s) to cease and desist such activity. These orders "shall fix a reasonable time" for compliance, and shall contain the findings of fact upon which they are based. A polluter can be subject to civil penalty for failure to comply with a lawful order rendered by the Director or by the Commission.

In 1971, the State Legislature made attainment of air quality standards a mandate by providing "priorities in the preparation and implementations of a plan." The 1971 amendments also provided and established guidelines for the control of motor vehicle pollution, the necessity of permits for certain new and modified stationary sources of air pollution,

the necessity of permits for certain new and modified stationary sources of air pollution, and the procedures for making available to the public certain data, records, or reports of information upon request.

In West Virginia, the two most serious pollutants are particulates and sulfur oxides. Particulates are the liquid and solid matter in the air, such as smoke, fly ash, dust, acid mists, and fumes. Sulfur oxides are compounds released from the burning of sulfur-containing fuel and from certain processes. The largest sources of these pollutants are power generating plants, steel mills, metallurgical furnaces, and coal and oil fuel burning units.

West Virginia has been divided into ten Air Quality Control Regions (AQCR's), four interstate and six intrastate. In establishing AQCR's, designation was made on the basis of similar topography and/or land use, political or natural boundaries. In establishing the Interstate AQCR's, designation was made on the basis of common air masses capable of containing and carrying air pollutants without regard to state boundaries. When levels of pollutants in these areas become excessive, individual states, having jurisdiction restricted to their own boundaries, might be unable to control pollution satisfactorily. Through the establishment of federal Interstate AQCR's, some of these problems are simplified. Table I below lists the AQCR's and their attainment status of national ambient air quality standards as of June 30, 1976, and provided by EPA's State Air Implementation Plan Progress Report.

TABLE I
WEST VIRGINIA

Attainment Status of National Ambient Air Quality Standards
by Air Quality Control Region[1]

AQCR	Pollutant	TSP	SO_2	CO	O_x	NO_2
103.	Huntington-Asnland-Portsmouth Ironton Interstate (W.Va. portion)	X			AR	
113.	Cumberland-Keyser Interstate (W. Virginia portion)				AR	
179.	Parkersburg-Marietta Interstate (W. Va. portion)				AR	
181.	Steubenville-Weirton-Wheeling Interstate (W. Va. portion)	AR	X		AR	
231.	Allegheny				AR	
232.	Central West Virginia				AR	
233.	Eastern Panhandle				AR	
234.	Kanawha Valley	AR			AR	
235.	North Central West Virginia				AR	
236.	Southern West Virginia		X		AR	

[1] "X" indicates non-attainment of an applicable NAAQS, but no call for a SIP revision.

"AR" indicates non-attainment of an applicable NAAQS and a call for a SIP revision for attainment and maintenance.

"MR" indicates attainment of an applicable NAAQS, however, a SIP revision for maintenance is necessary.

A blank indicates attainment of an applicable NAAQS and no calls for SIP revisions.

To aid in plan development and evaluation, U.S. EPA, in cooperation with the Commission, has classified all AQCR's Priority I, II, or III for each pollutant, according to the complexity of the air pollution problem. Concentrations of the pollutants are highest in Priority I regions and lowest in Priority III regions. The regional priorities are shown in the chart on the following page.

For AQCR's classified Priority III, pollutant levels in those AQCR's are presently below secondary standards. Monitoring of these pollutants is conducted as part of the State's anti-degradation policy. By this policy, the Commission ensures the cleanest air possible in West Virginia. Where air quality is better than the standards, the Commission will develop long-range plans to see that it remains so. The air quality of an area will not be lowered unless it is proven to the Commission that such a change in air quality is necessary for the economic or social development of the State and will not violate the air quality and emission standards set by the Commission.

For AQCR's classified Priority I or Priority II, plans have been made and approved to reduce pollutant levels to the air quality standards by using the following method of control.

The Commission's main strategy for meeting the standards is to require polluters to reduce their emissions by any of the following methods: modifying processes, adding new control equipment, improving or changing fuels, replacing existing equipment, and/or designing and installing gas-cleaning

Figure 2 CLASSIFICATION OF AIR QUALITY CONTROL REGIONS, WEST VIRGINIA

AIR QUALITY CONTROL REGION	POPULATION 1970	REGIONAL PRIORITY					
		Particulate Matter	SO_2	CO	NO_x	O_x	HC
I Steubenville-Weirton-Wheeling Interstate	Urban 115,109 Rural 56,120	I	I	III	III	III	III
II Parkersburg-Marietta Interstate	Urban 76,186 Rural 69,052	I	II	III	III	III	III
III Huntington-Ashland-Portsmouth-Ironton Interstate	Urban 91,139 Rural 77,666	I	III	III	III	III	III
IV Kanawha Valley Intrastate	Urban 163,942 Rural 108,698	I	III	III	III	III	III
V Southern West Virginia Intrastate	Urban 67,633 Rural 303,325	III	III	III	III	III	III
VI North Central West Virginia Intrastate	Urban 110,156 Rural 141,305	I	III	III	III	III	III
VII Cumberland-Keyser Interstate	Urban 3,784 Rural 11,720	I	I	III	III	III	III
VIII Central West Virginia Intrastate	Urban 18,301 Rural 122,622	III	III	III	III	III	III
IX Allegheny Intrastate	Urban 15,592 Rural 125,704	III	III	III	III	III	III
X Eastern Panhandle Intrastate	Urban 17,649 Rural 48,534	III	III	III	III	III	III

devices. The Commission also regulates any construction, modification, or relocations of a polluting source.

Dates must be set for accomplishing these actions, and these dates determine a compliance schedule. Polluters must submit compliance schedules, and these may be approved or rejected by the Commission. If the polluter does not submit an acceptable schedule, the Commission will, by order, determine the compliance schedule for the polluter. Failure to follow such compliance programs or the Commission's orders is a violation of the State Law and could result in fines or injunctive action against the polluter.

After a polluter has completed his compliance schedule, periodic evaluations, including stack tests, visual observations, and continuous monitoring, will be made to ensure continued compliance. Such inspections are called "source surveillance". Additional evaluations will be performed if found necessary.

Another type of surveillance, air quality surveillance, is used to determine the overall quality of the air. Ambient air sampling stations are established in every region, the number depending primarily upon population density. Other factors also taken into consideration include source concentration, meteorology, geography, and topography of the region.

The WVAPCC will take action to prevent an excessive buildup of air pollutants during times of unfavorable meteorology (air stagnation and inversions), thereby preventing an emergency situation in which human health would be endangered. To this end, three stages of criteria have been developed, and specific emission reduction plans will be implemented

by polluting sources at each criteria stage. These stages are Alert, Warning, and Emergency, and are based upon increasing pollutant concentrations.

A stage is declared by the Director and/or Commission when a specific pollutant concentration is reached. Stages will be broadcast over all forms of the media; citizens will be informed of any actions they should or must take.

To date, 479 major sources of air pollution listed in Column A have been ordered to submit abatement schedules which were evaluated, amended, and/or approved by the Commission during the past fiscal year.

Plant schedules are now in operation to comply with the increments of progress for cleanup called for in each plan. The schedules were submitted by sources under the regulations listed below.

The sources coming into compliance during the past fiscal year are listed in Column B under the following regulations.

	A	B
REGULATION II: "To prevent and Control Particulate Air Pollution from Combustion of Fuel in Indirect Heat Exchangers"	124	29
REGULATION VII: "To Prevent and Control Particulate Air Pollution from Manufacturing Process Operations"	256	114
REGULATION X: "To Prevent and Control Air Pollution from the Emission of Sulfur Oxides"	78	50
REGULATION IV:"To Prevent and Control the Discharge of Air Pollutants into the Open Air Which Causes or Contributes to an Objectionable Odor or Odors"	21	

B. Workforce Profile

The information for this section was obtained primarily through on-site interviews with professionals working for the WVAPCC and various materials and documents provided by them.

The West Virginia Air Pollution Control Commission has a staffing level of 59 persons at present. As indicated in Table II, fifteen are classified as engineers. Of these, six are mechanical engineers, one with a masters degree, four are chemical engineers, two are air pollution engineers, both with masters degrees, and two are civil engineers, again, both with masters degrees. One engineer holds an associate degree in drafting and design.

Of the twelve scientists, eight are chemists, including the Director of the Commission. One of the chemists has a masters degree. Another scientist is a meterologist with a masters degree, and the three remaining scientists are air pollution specialists with degrees in physics, biology, and math. All of the technicians have a high school education, and many have had some college or prior work experience. One of the lab technicians has an associate degree and the other two have high school educations plus prior work experience.

The nineteen positions classified as "other" in the table include eleven secretaries, two accountants, one data processing specialist, an information specialist, a statistical clerk, a photographer, a messenger, and a janitor.

Table II

WEST VIRGINIA AIR POLLUTION CONTROL COMMISSION

Current (1976) Staffing Level

POSITION	1976
Engineer	15
Scientist	12
Technician	10
Lab Technicians	3
Other	19
TOTAL	59

C. Workforce Projections

Figures in this section are based upon the best professional judgements of personnel working in the state's air pollution control program. They represent projected growth within the WVAPCC.

Program officials indicate that staffing levels can be expected to increase to about 100 persons, or a gain of 41, over the next five years. This estimate of increased needs is based in part on the anticipation that U.S. EPA will be requiring the state to regulate additional emissions, although this decision had not been made at the time this study was completed. The additional personnel indicate a future growth rate of about eleven percent as illustrated in Table III. This contrasts with past growth of the Commission, which has occurred at a rate of approximately five percent per year.

The major occupational increase will occur among engineers with only a small demand for those in other occupations. Generally it is believed that engineers with differing specializations will continue to be utilized

in the program. The Commission is not covered by the state's civil service regulations, and the hiring of personnel is, for the most part, at the discretion of the Commission Director. A minimum of a bachelor's degree is required for the professional positions and, although there are a number of persons on the staff with advanced degrees, the Commission does not specifically recruit such people. According to Commission professionals, the most desirable recruits are those with degrees in one of the sciences plus relevant work experience. Most of those recruited in the past have been West Virginians or persons attending West Virginia colleges.

Turnover has not been a significant problem except among chemical engineers, where the turnover rate is considered to be about 20 percent. This higher rate is accounted for by the fact that state salaries do not advance fast enough to be competitive with private industry and there are several private employees of chemical engineers in the Charleston area.

TABLE III

WEST VIRGINIA AIR POLLUTION CONTROL COMMISSION

Workforce Projections to 1982 (est.)

POSITION	1976	1977	1978	1979	1980	1981	% annum turnover (average)	% annum growth/decline (average)
Engineer	15	20	25	30	35	40	20%	23%
Scientist	12	12	13	13	14	15	N/A	5%
Technician	10	10	11	11	12	13	N/A	6%
Lab Technician	3	3	3	3	3	3	N/A	N/A
Other	19	21	23	25	27	29	N/A	11%
TOTAL	59	66	75	82	91	100	N/A	11%

D. Training and Certification

The only training provided by the WVAPCC is informal on-the-job training for new employees to acquaint them with the state air pollution control law and regulations and operations of the Board. Program professionals indicated support for EPA sponsored training programs and would like to see them increased. In FY 1976, fifteen persons from West Virginia attended courses offered by EPA's Air Pollution Training Institute in Research Triangle Park, North Carolina. Program personnel are also encouraged to take job related courses offered by local colleges and universities.

E. Career Potential

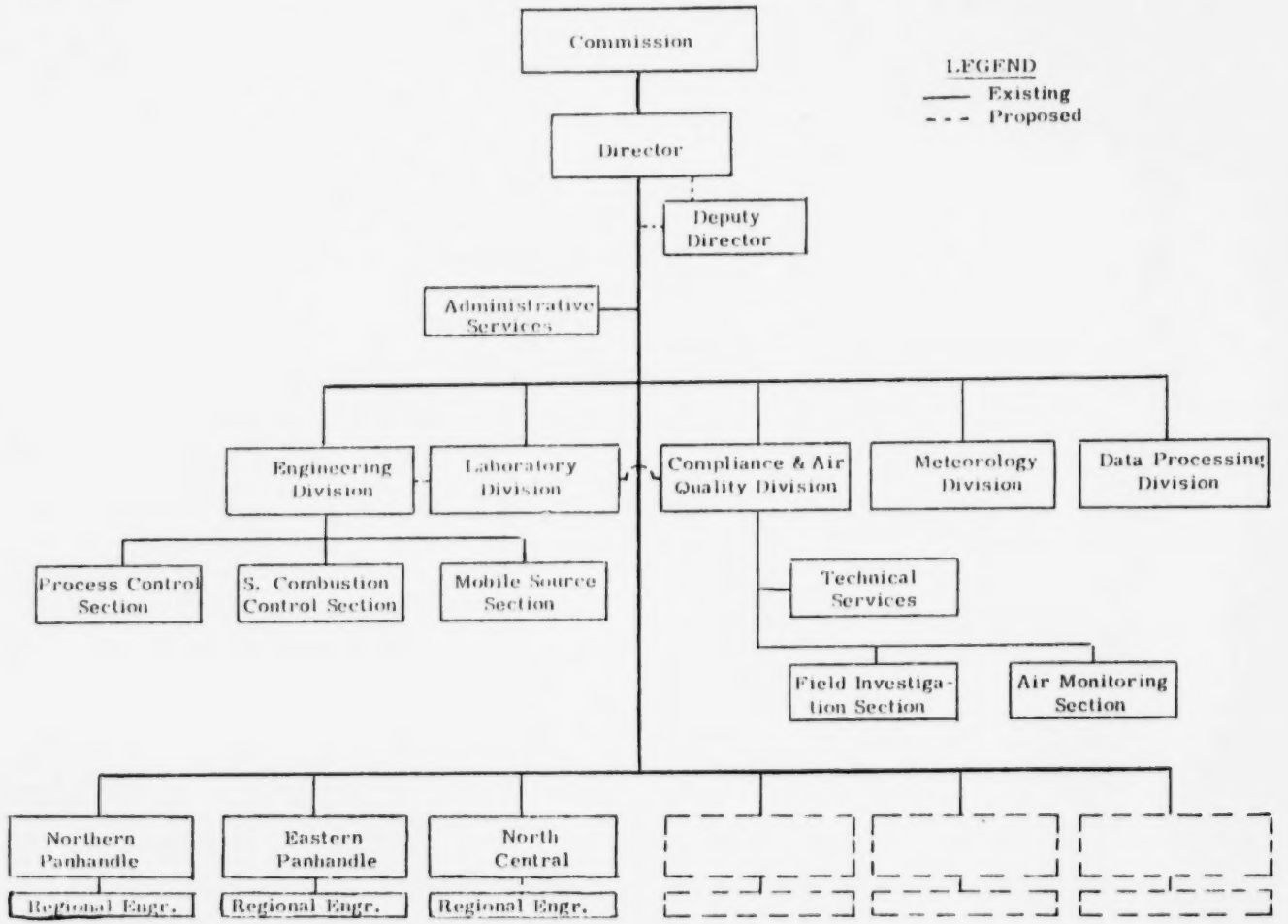
The potential for future jobs in air pollution control appears to be good for engineers. Most of the program growth is expected in areas requiring professionally trained engineers with a minimum of a bachelor's degree in one of the engineering disciplines. The most desirable backgrounds combine the degree with some amount of relevant work experience. Turnover among the program's chemical engineers also provides considerable opportunity for individuals trained in this field. Some potential is expected to exist for persons without four-year degrees, particularly as technicians and lab technicians, but only a limited amount of growth is expected in these occupations.

F. Conclusion

The West Virginia Air Pollution Control Commission is an autonomous state agency responsible for providing a statewide program of air pollution prevention, abatement and control. The Commission consists of seven members and has a staff of 59 people to implement the program. Considerable growth in the program is anticipated over the next five years resulting in a significant need for engineers. Other than this, career potential is considered to be limited.

Figure 3

WVAPCC ORGANIZATION CHART



II. NOISE

A. Introduction

There is currently no active noise program in the state of West Virginia. The State Department of Health has been delegated authority over noise activities in the state, but there are currently no noise standards to enforce by law. The only existing noise restriction in the state applies to motor vehicle mufflers.

B. Workforce Profile

There are currently no state or local personnel involved in any noise control activities in the State of West Virginia.

C. Workforce Projections

Workforce projections for noise activities in the state are unapproachable at this time, due to the fact that no noise program exists, and future plans for the establishment of a noise program are as yet undetermined. Noise legislation has been introduced several times, but to date has failed to be passed by the state legislature. It is conceivable that with the inception of a noise program in the state at some future date, there would be a demand for personnel with backgrounds in engineering, acoustics, and some sciences, such as physics.

D. Training and Certification

There is no training in noise control offered by the State of West Virginia, due to the fact that there is no active noise program at present.

E. Career Potential

The lack of a noise program in the State of West Virginia at present precludes the existence of any career opportunities in this field. If legislation establishing a noise program is enacted at some future date, there would probably be some career potential for persons with backgrounds in engineering, acoustics, and some sciences, such as physics.

F. Conclusion

No plans for the establishment of a noise program in West Virginia exist at this time. The creation of such a program in the future would most likely be contingent upon both the recognition of noise as a real environmental problem on the part of the state legislature, and the availability of federal funds to support the program.

III. PESTICIDES

A. Introduction

West Virginia's pesticide control program is the responsibility of the State Department of Agriculture. Within the Department, program responsibilities are divided between the Plant Pest Control Division which has implementation and enforcement activities and the Consumer Protection Division which handles dealer licensing, certification, and pesticides registration.

The West Virginia Pesticide Use and Application Act of 1975, requiring the certification of public and private applicators and the licensing of pesticide dealers, brought the state's program into compliance with the federally mandated requirements of the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA). The law also provides for a seven member Pesticide Advisory Board which is responsible for advising the Commissioner of Agriculture on the problems relating to the use and application of pesticides. The members of the Board include the Commissioner of Agriculture, a structural pest control applicator, an environmental health specialist, a representative of the agricultural chemical industry, a person knowledgeable in the area of wildlife resources, a producer of crops on which pesticides are applied and a citizen who is knowledgeable in the field of pesticides.

The state has established three classes for commercial applicators which are: 1) Commercial Applicator, 2) Licensed Applicator (one who

owns or manages a pesticide application business), and 3) Licensed Public Operator (government employee). There are also nine categories in which a commercial applicator can be certified including:

1) Agricultural Pest Control
   a) Agricultural Plant Pest Control
   b) Agricultural Pest Control Aerial Applicator
   c) Animal Pest Control
2) Forest Pest Control
   a) Aerial Forest Pest Control
3) Ornamental and Turf Pest Control
   a) Aerial Ornamental and Turf Pest Control
4) Seed Treatment
5) Aquatic Pest Control
   a) Aerial Aquatic Pest Control
6) Right-of-Way Pest Control
   a) Aerial Right-of-Way Pest Control
7) Industrial, Institutional, Structural and Health Related Pest Control
   a) General Pest Control
   b) Structural Pest Control
   c) Fumigation Pest Control
8) Demonstration and Research Pest Control
   a) Demonstration Pest Control
   b) Research Pest Control
9) Licensed Public Operator
   a) Public Health Pest Control
   b) Regulatory Pest Control.

B. Workforce Profile

Information for this section was provided primarily through on-site interviews with professionals working in the pesticide program and the use of materials and documents supplied by them.

The current staffing level of West Virginia's pesticide program consists of three people, two of whom are located in the Plant Pest Control Division and one in the Consumer Protection Division. They are

categorized into two occupational groups as illustrated in Table IV. The two persons listed as scientists are in the Plant Pest Control Division and they are responsible for the administration and enforcement of the program. They are both professionals with backgrounds in the natural sciences. The Agriculture Department is not subject to the state civil service requirements and as a result there are no specific occupational or educational requirements for positions in pesticide control. The division director has the freedom to hire those persons that he considers best qualified. The one person classified as "other" in the table is in the Consumer Protection Division and is a clerical employee who is responsible for registration of pesticides and pesticide products.

In addition to state program personnel, professionals estimate that there are 2,048 commercial applicators and 28,984 private applicators in the state that must be certified under the law.

TABLE IV

WEST VIRGINIA DEPARTMENT OF AGRICULTURE

Plant Pest Control and Consumer Protection Divisions
Pesticide Programs
Current (1976) Staffing Level

Position	1976
Scientist	2
Other	1
TOTAL	3

C. Workforce Projections

Data obtained for this section comes primarily from on-site interviews with program professionals and represents the best professional judgments of these persons.

Program officials in the Plant Pest Control Division have estimated that the pesticide program must double in staff size in order to do an adequate job. The Division has applied to U.S. EPA for a grant to provide the funds to hire enforcement personnel. It is estimated that two additional persons would be hired for this function and that they would be employed by 1978. Professionals anticipate that these positions would require professionals with training in the natural sciences although, as previously indicated, the positions are not under civil service. Preferably, another clerical position would also be added to work in licensing, re-certification and registration. Once this increased staffing level is attained, no further increases are currently anticipated. Table V below illustrates staffing projections.

Turnover is not considered to be of any significance and is, therefore, not listed in the table.

TABLE V

WEST VIRGINIA DEPARTMENT OF AGRICULTURE

Plant Pest Control and Consumer Protection Divisions
Pesticide Programs
Workforce Projections to 1982 (est.)

Position	1976	1977	1978	1979	1980	1981	%/annum turnover (average)	%/annum growth (average)
Scientist	2	2	4	4	4	4	N/A	20%
Other	1	1	1	2	2	2	N/A	20%
TOTAL	3	3	5	6	6	6		17%

D. Training and Certification

The West Virginia Cooperative Extension Service has the overall responsibility for the state's pesticide applicator certification training program. The primary method of training used by the Extension Service is a home study course provided to applicators by the Service. The basic material contained in the course is the Pesticide Applicator Core Training Manual of the Northeastern Regional Pesticide Coordinators, prepared by Cornell University, with supplemental material developed by the Extension Service and the Department of Agriculture. Personal training is also available to any applicator who desires it and is provided by Extension Service agents. As of January 1, 1977, officials indicated there were 606 commercial applicators in the state, although no private applicators had yet been trained. They further estimated that 1,442 commercial and 28,984 private applicators remain to be trained.

Although the Department of Agriculture itself provides no training for pesticides program personnel, officials indicated that personnel have taken advantage of U.S. EPA sponsored training. They also indicated that EPA is willing to sponsor a workshop in West Virginia for any new program personnel that may be hired.

E. Career Potential

Potential for careers in pesticides in West Virginia is anticipated to be very limited over the next five years. Although the percentage increase in the program appears to be significant, it translates into only three additional persons. The opportunity that does exist is expected to be for professionals with an educational background in the natural sciences.

Career opportunities for commercial applicators are difficult to predict since no projections of workforce growth in this area are available. Since this appears to be the area with greatest personnel turnover, it can be assumed that the greatest career potential exists here. Other career possibilities may be available in the fields of integrated pest management and pesticide disposal, but figures are generally not available to provide information on the types of jobs or numbers of people that might be required. An exception is a U.S. Department of Agriculture study done in 1972, which indicated the potential workforce requirements for integrated pest management to be more than 400 persons in West Virginia. Most of these persons

would be field scouts, a position requiring a high school education and some knowledge of entomology. The remaining persons would be professional crop protection specialists with backgrounds in the physical sciences. The Agriculture Department based its figures on one field scout per 2,000 acres of cropland and one crop protection specialist per 30,000 acres.

F. Conclusion

The pesticide program in West Virginia is divided between the Divisions of Plant Pest Control and Consumer Protection in the State Department of Agriculture. A workforce of three persons carry out the enforcement, registration, and certification activities. Even the anticipated doubling of the program's staff over the next five years will result in only three additional jobs. Program officials anticipate that two of these will be filled by professionally trained scientific personnel while the third will require a clerical employee.

IV. POTABLE WATER

A. Introduction

The objective of West Virginia's water supply or potable water program is to ensure that all public water supplies provide safe and sanitary drinking water to all citizens. Responsibility for the administration of the program lies with the Environmental Health Service of the State Department of Health.

The program's activities are concerned with the implementation and enforcement of the federal Safe Drinking Water Act (SDWA). The Act mandates U.S. EPA to establish National Primary Drinking Water Regulations, provides assistance to the states, and protects underground sources of drinking water. The State of West Virginia is preparing to assume primacy under the Act for its implementation and enforcement.

The Act also stipulates that each public water supply is required to monitor, test and otherwise operate in compliance with the regulations. Of immediate concern to West Virginia's potable water program is the bringing of community sources of supply into compliance.

B. Workforce Profile

The information contained in this section was obtained primarily through on-site interviews with professionals working in the potable water program and through various materials and documents supplied by them.

The current staffing level of the potable water program is 22. They are classified into four occupational categories as illustrated in Table VI. The seven engineers are chemical or sanitary engineers and require a bachelor's degree in an engineering science. The program also employs five chemists and five microbiologists, all of whom are required to have degrees in their respective sciences. The five positions listed as "other" are secretarial.

TABLE VI

WEST VIRGINIA DEPARTMENT OF HEALTH

Environmental Health Service
Potable Water Program
Current (1976) Staffing Level

Position	1976
Engineer	7
Chemist	5
Biologist	5
Other	5
TOTAL	22

C. Workforce Projections

Projected growth in the water supply program is expected to increase significantly over the next five years according to professionals working in the program. The present level is anticipated to increase at a rate of 15 percent per year, doubling the size of the workforce, as shown in Table VII. The largest demand would be for engineers. Program officials indicated that two engineers would be needed for each of the Department's five regions. There will

continue to be a need for biologists and chemists but these opportunities will not be as great as those for engineers. Requirements for these positions are not expected to be different from current requirements over the next five years. Professionals have indicated that the need for the increased numbers of personnel is due to increased federal requirements of the Safe Drinking Water Act.

TABLE VII

WEST VIRGINIA DEPARTMENT OF HEALTH

Environmental Health Service
Potable Water Program
Workforce Projections to 1982 (est.)

Position	1976	1977	1978	1979	1980	1981	%/annum turnover (average)	%/annum growth (average)
Engineer	7	10	14	17	19	19	N/A	19%
Chemist	5	5	6	7	7	7	N/A	13%
Biologist	5	6	7	7	7	7	N/A	8%
Other	5	9	11	13	14	14	N/A	16%
TOTAL	22	30	38	44	47	47		15%

D. Training and Certification

Training programs for potable water personnel in West Virginia are the responsibility of the State Health Department. The training provided includes both informal on-the-job training for new employees as well as short courses designed for professionals in the program and for operators. Personnel are also encouraged to take job related college courses and are sent to outside-sponsored training as often as possible.

E. Career Potential

Projections indicate that careers in potable water in West Virginia will be significant at the state agency level. Professionals working in the Environmental Health Service have estimated that the program will double in staff size over the next five years. Most of the opportunity will be available to engineers, along with some demand for persons with professional training in chemistry and biology. Little opportunity is anticipated for non-professionals with technical training.

F. Conclusion

The state potable water program in West Virginia is expected to expand considerably over the next five years. Projections indicate that it will double in workforce size as a result of the Safe Drinking Water Act. Career opportunity is estimated to be best for engineers, with a lesser demand for biologists and chemists.

The future for plant operators and laboratory personnel also seems to hold some promise. Although specific growth figures are not available, new legislation will demand increases in both areas. Generally, operators and laboratory personnel might anticipate a ten percent per annum growth potential.

V. RADIATION

A. Introduction

West Virginia's radiation program comes under the jurisdiction of the Bureau of Industrial Hygiene, Environmental Health Services, of the State Department of Health. At the federal level, responsibility for radiation control is shared by the U.S. Environmental Protection Agency (EPA), the Nuclear Regulatory Commission (NRC), the Energy Research and Development Administration (ERDA), and the Department of Health, Education and Welfare (HEW). Authority for enactment and enforcement of radiation regulations is granted through several federal laws, including the Federal Water Pollution Control Act amendments, the Safe Drinking Water Act, the Clean Air Act, the Marine Protection, Research and Sanctuaries Act, and the Atomic Energy Act.

The radiation program in the State of West Virginia currently is involved in no environmental sampling, and none is anticipated for the future. State personnel conducted some air sampling until two years ago. The program does have monitoring capabilities, but program activities are directed primarily towards medical radiation, including surveys of X-ray equipment. State personnel often accompany NRC personnel on visits within the state.

Table VIII below represents the estimated number of registered radium-radon facilities in the state in FY 1975 and Table IX provides a general breakdown of program activities regarding these facilities in that year.

TABLE VIII

STATE OF WEST VIRGINIA

Registered Radium-Radon Facilities
(Estimated by Type of Facility - FY 1975)

Total	Medical	Industrial	Other
50	31	16	3

TABLE IX

STATE OF WEST VIRGINIA

Radium-Radon Program Activities - FY 1975

Initial Inspections	Reinspections	Facilities not in Compliance	Facilities brought into Compliance
0	7	3	0

Source: Report of State and Local Radiological Health Programs, Food and Drug Administration, Department of Health Education and Welfare, July, 1976.

As of the end of 1975, 131 NRC licenses of Byproduct, Source, and Special Nuclear Materials had been issued in the State of West Virginia.

At this time there are no nuclear plants on-line in the state, nor are there any planned; thus program activities are not geared toward radioactive waste disposal.

B. Workforce Profile

There is only one person, a scientist, currently employed in the radiation program at the state level. According to a 1975 HEW Report of State and Local Radiological Health Programs, state and local radiological health personnel have been involved in several aspects of

radiation control other than environmental surveillance. The personnel include, by category, one radiological health director (part-time), one radiological health specialist and two radiological health technicians. The report also includes a percentage breakdown of program areas in which these personnel are involved. These are: basic planning and administration, 1.10; X-ray survey and control, 2.65; environmental surveillance, 0; radioactive materials, .10; electronic products, .10; and other radiological health activities, .05.

C. Workforce Projection

In order to comply with regulations imposed by the Safe Drinking Water Act, West Virginia must initiate radiation sampling activities by 1978. It is estimated that one person will be required for these sampling activities. Within one year after the state adopts SDWA standards for radiation levels in drinking water, there will be a need for two technicians (preferably college graduates) and one chemist. At present, the radiation laboratory has no staff to lend analytical support to environmental surveillance activities.

TABLE X

WEST VIRGINIA DEPARTMENT OF HEALTH

Environmental Health Services
Bureau of Industrial Hygiene
Radiation Program
Workforce Projections to 1982 (est.)

Position	1976	1977	1978	1979	1980	1981	%/annum turnover (average)	%/annum growth (average)
Scientist	1	1	1	1	1	1	N/A	0
Technician	0	0	0	2	2	2	N/A	40%
Other	0	0	0	1	1	1	N/A	20%
TOTAL	1	1	1	4	4	4		60%

D. Training and Certification

Since there is currently only one person in the Bureau of Industrial Hygiene working in radiation, no training programs, formal or informal, are offered at the state level. EPA's Office of Radiation Programs offers one course for professionals. This is an interagency course on emergency response planning conducted at the Defense Civil Preparedness Agency Staff College in Battle Creek, Michigan, and coordinated by the Nuclear Regulatory Commission (NRC). The bulk of the training programs offered to states at the federal level in radiation are conducted by the NRC.

Some training in radiation is available in the State of West Virginia at the college level. West Virginia Institute of Technology offers an Allied Health Program which provides technical training in radiation, and West Virginia State College is in the process of starting a program to train health physicists.

E. Career Potential

There will be a moderate increase in career opportunities in radiation at the state level over the next five years, due to the fact that the program is obliged to commence activities to ensure state compliance with SDWA regulations. These opportunities will exist for scientists and technicians with a minimum of four years of college. There will also be some demand for clerical personnel in the program.

Compliance obligations would also suggest a need for an increase in radiological health personnel at the state and local level.

F. Conclusion

The radiation program in West Virginia is expected to undergo a moderate expansion of activities and workforce over the next five years due to the fact that it must initiate new activities in order to comply with SDWA regulations. No new activities in the areas of nuclear power or radioactive waste disposal are anticipated, as there are no plans at present for construction of any nuclear power plants in the state.

VI. SOLID WASTE

A. Introduction

The West Virginia solid waste program is administered within the Environmental Health Services Section of the State Department of Health. In 1970 the Department formally proposed the creation of a state operating agency as a means to provide cost effective and environmentally conscious solid waste management. On the sixth attempt, the West Virginia Resource Recovery - Solid Waste Disposal Authority Act was passed by the Legislature and signed into law on April 27, 1977. Implementation under the Authority is at least a year away but program personnel are highly optimistic about its future effect on solid waste management practices.

West Virginia program personnel indicate that the use of landfill is the only known feasible method for solid waste disposal in the state at present. It is five to ten times cheaper than other acceptable disposal methods and the state's predominantly rural population and small towns are not likely areas for resource recovery facilities. There are 57 sanitary landfills in the state that meet state standards and have permits. There are an additional 206 open town and community dumps without permits. This number is gradually decreasing at a diminishing annual rate. Of the 57 permitted sites, 28 (49%) are publicly owned, 29 (51%) are privately owned. No more than 3 or 4 of the sites have ultimate capacities of over 150,000 tons.

State program personnel recognize that landfilling is not the ultimate solution to the waste management problem. Eventually, wastes must be reduced and those that cannot be eliminated must be reused. The state has one privately built ags pyrolysis plant in South Charleston, owned by Union Carbide Corporation. The Corporation advised one county government that

annual costs of the system would be 2.4 million dollars, as compared to a $150,000 current budget for landfill. No other resource recovery facilities are seriously planned at present, but several private reclamation operations have been in existence for years.

B. Workforce Profile

Information for this section was obtained from interviews with professionals in the solid waste program and from materials and documents supplied by them.

West Virginia's solid waste program is a regulatory arm with a staffing level of eight people. Four of these are sanitarians, illustrated in Table XI, utilized primarily in enforcement and inspection activities and normally have backgrounds in public health or chemistry. The remaining staff consists of two engineers, a chemist, and a secretary classified as "other" in the table. Requirements for engineers include a four-year degree in engineering sciences such as environmental, chemical, or sanitary. The chemist may have a bachelor's degree in chemistry or in chemical engineering.

TABLE XI

WEST VIRGINIA DEPARTMENT OF HEALTH

Environmental Health Service
Solid Waste Program
Current (1976) Staffing Level

Position	1976
Engineer	2
Sanitarian	4
Chemist	1
Other	1
TOTAL	8

Additional workforce in solid waste exists at the community level in landfill operators and waste collectors in both the private and municipal sector. Because these activities are operated locally and independently of one another, only a rough estimate can be given. It is believed that approximately 800 persons are employed in the field.

C. Workforce Projection

Data contained in this section are based on the best professional judgement of persons in the program and on planning materials they were able to supply.

The solid waste program has had a stable workforce level for the past several years. Over the next five years professional staffing is expected to triple or more due to new legislation enacted at both the state and federal levels. Passage of the West Virginia Solid Waste Authority Act is expected to account for half of the additional jobs although officials were unable to make a specific determination of the number required. The Federal Resource Conservation and Recovery Act is also anticipated to help the state's program through increased federal resources.

An across-the-board increase is projected for professional categories as shown in Table XII. Since the new Solid Waste Authority has not begun operation as yet, its requirements for personnel cannot be determined. As a result, the projection shown should be considered only as an estimate of the types of occupations required. An assumption of additional personnel for resource recovery and hazardous waste has been made.

TABLE XII

WEST VIRGINIA DEPARTMENT OF HEALTH

Environmental Health Service
Solid Waste Program
Workforce Projections to 1982 (est.)

Position	1976	1977	1978	1979	1980	1981	%/annum turnover (average)	%/annum growth (average)
Engineer	2	2	1	2	2	2	N/A	N/A
Sanitarian	4	4	4	4	5	5	N/A	5%
Chemist	1	1	1	1	1	1	N/A	N/A
Other	1	1	2	2	3	3	N/A	40%
TOTAL	8	8	8	9	11	11		8%

D. Training and Certification

No formal training programs exist in West Virginia's solid waste program. An informal on-the-job training program for new personnel to acquaint them with the solid waste background, landfill operations and pertinent Department procedures is ongoing.

Potential for future solid waste training activities exists under the recently enacted Resource Conservation and Recovery Act. The Act authorizes EPA to enter into grants or contracts for the development and implementation of programs to train individuals for occupations in solid waste management. It also authorizes funding for training instructors and supervisory personnel for the instruction and supervision of persons involved in the design, operation, and maintenance of solid waste disposal and resource recovery equipment and facilities. It is anticipated that this federal funding may serve as a catalyst to the state's training activities.

E. Career Potential

Potential for careers in solid waste management in West Virginia appear promising with the creation of the Solid Waste Authority and the increased federal commitment to solid waste management through the Resource Conservation and Recovery Act.

Resource recovery facilities are not considered to be feasible in much of the state; career opportunities can therefore be expected to be limited to sanitarians and landfill operators. Landfills will likely continue to be the most widely utilized means for waste disposal. Some additional opportunities may be available for engineers and scientists in the planning and design of any resouce recovery facilities that are initiated.

F. Conclusion

West Virginia's solid waste management efforts are expanding with the creation of an independent Solid Waste Authority. This, plus federal involvement through the Resource Conservation and Recovery Act,will lead to a tripling of the professional staffing level. Career opportunities are considered to be best for sanitarians and landfill operations personnel.

VII. WASTEWATER

A. Introduction

Reponsibility for West Virginia's wastewater program is shared by the Division of Sanitary Engineering, State Department of Health and the Division of Water Resources, State Department of Natural Resources. The objectives of the Division of Sanitary Engineering are to protect the public health through proper design, operation, and maintenance of all sewerage systems, excreta disposal methods, and plumbing systems. In addition, the State Department of Health is authorized to enforce all of the laws of the State concerning public health, make inspections and promulgate reasonable rules and regulations to control the sanitary conditions of streams, sources of water, and sewage treatment facilities, including design of the latter.

The Division of Sanitary Engineering, Sewage Program, reviews and approves all sewers and sewage treatment systems, and issues construction and operational permits for these systems. The State Department of Health is also empowered to conduct hearings and grant declaratory rulings in regard to residential land development. In addition the Sewage Program administers the operators certification, examination, and training program.

The objectives of the Division of Water Resources are to maintain reasonable standards of purity and quality of water for use by all citizens of the state. Within the Department, there is a Water Resources Board authorized to promulgate rules and regulations setting standards of water quality and effluent limitations for waters of the state. It can also enter into agreements with other state and interstate agencies relating to the control and reduction of water pollution. The Board consists of five members appointed by the Governor who are knowledgeable about the state's water resources. At least one member is required to

have experience in industrial pollution control.

The Division of Water Resources administers and enforces the state's water laws to control the pollution of surface and ground waters. In accomplishing this task, the division correlates its activities with various federal, state, and local agencies.

The U.S. Environmental Protection Agency's Sewage Treatment Construction Grants Program, providing 75 percent funding for municipalities and public service districts needing sewage treatment, is a cooperative effort of the Division's Municipal Grants Branch, EPA, and other agencies.

Other cooperative programs with EPA are the special projects and permit programs. The Special Projects Section of the Division is involved with pilot projects to control acid mine drainage from abandoned coal mines.

The Permits Branch of Water Resources issues water pollution control permits to industries, municipalities, mining operations other than strip mining, and coal preparation plants in the state. The state permit system is designed to ensure that all dischargers comply with the Water Pollution Control Act and the state's water quality standards. The Permits Branch also certifies that the National Pollutant Discharge Elimination System (NPDES) permits meet West Virginia's applicable water quality standards.

The permit system is enforced and monitored by the Surveillance, Analysis and Enforcement Branch. Samples of water from the streams and effluents from dischargers are analyzed and the data compiled in the Division laboratory in Charleston.

The Division has five district offices and one field laboratory. Regular inspections of discharging facilities and investigations of

spills and other pollution related accidents are carried out by field inspectors and supervisors in the district offices.

Pollution planning and water and related land resources planning are two other important aspects of the Division's activities. The Pollution Planning Section has classified each stream in the state according to its water quality, and has assigned waste load allocations to dischargers in the state. The Water Resources Planning Section conducts comprehensive water and related land resources planning studies on all the river basins of the state.

B. Workforce Profile

The information contained in this section was gathered from on-site interviews with professionals working in the waste water programs and through various materials and documents provided by them.

The Division of Water Resources has been organized to facilitate its duties and responsibilities under the Federal Water Pollution Control Act amendments (FWPCA) of 1972. Four sections comprise the Division, including: Permits and Pollution Control; Surveillance, Analysis, and Enforcement; Municipal Grants; and Planning. A description of the sections is contained below, as excerpted from the Department of Natural Resources' 1975 Annual Report.

> Permits Section: This section is divided into four units: Mine Drainage, Industrial, Municipal (Permits), and Coal Preparation. Its function is to review applications and prepare water pollution control permits for the Chief's signature. Review of National Pollutant Discharge Elimination System's (NPDES) water pollution permit is also a responsibility of this unit.
>
> The Coal Preparation Unit's inspection effort is concentrated in the control of "black water" from coal preparation facilities.

Permits now cover the total plant area. This includes haulroads, conveyor belts, refuse or gob piles, raw coal handling facilities, sewage disposal systems, etc., thereby allowing for more effective control of potential water polluting activities.

There are approximately 250 coal preparation facilities in West Virginia, of which 75 are inactive and 175 active. Of the above 250, 25 are under construction and/or proposed, and 10 new plants or modified old plants were placed in operation during the fiscal year. All are inspected periodically.

An additional source of black water has been found to come from raw coal handling facilities (not connected with coal preparation facilities). There are now 130 of these facilities under the Division's periodic inspection program.

Sources of pollution have been defined more clearly due to the inspection program, helping to bring about corrective action. The use of conveyor belts, certain pipelines, and the construction of surface water diversion ditches and better maintenance of haulroads have aided in reducing sources of pollution that formerly were so extensive that corrective action was almost impossible.

Surveillance, Analysis, and Enforcement Section: This section has been broadened to consolidate compatible functions for more effective coordination of these activities. The existing water analysis laboratory was included, as well as those employees engaged in pollution monitoring. Pollution monitoring requires extensive use of the laboratory. The on-the-ground enforcement of water pollution laws is conducted by the division's field offices, and these are now part of this section. The Section is also charged with developing and coordinating all of the various federal requirements, such as the 305(b) Report, Compliance Monitoring, and Stream Monitoring, into a workable cohesive unit.

The Monitoring Unit conducted intensive surface water surveys at 178 locations for organic modeling and wasteload allocations. Samples and field data were collected monthly at 30 stations. Due to personnel limitations, the 60 stations designated for quarterly sampling were sampled only twice during the year. Compliance monitoring investigations were conducted at eight industrial facilities, followed by the completion and submission of reports to the Environmental Protection Agency.

Municipal Grants Section: The Municipal Program has been broken down into two major categories: Grants, and Operation, Maintenance and Specification Review. It is the responsibility of this section to coordinate with other sections to develop a completely coordinated municipal grants program, planning and implementing Step I, II, and III grants, and to begin the development and taking over of the O & M and Specification Review. The Water Resources Division administers the Sewage Construction Grant Funds program for West Virginia.

Planning Section: This section consists of the units of Water and Related Land Resources, Pollution Control Planning, and Special Projects. Overall pollution control planning for West Virginia is conducted, as well as planning the various responsibilities dictated by the Federal Water Pollution Control Act.

The current staffing level of the waste water program consists of 107 people in the Division of Water Resources. They have been classified into eight occupational categories as illustrated in Table XIII below. The engineers are generally chemical, environmental, or sanitary engineers by training. The chemists, geologists and biologists are each required to have professional training in their respective fields. Eleven persons are classified as planners who are professionals with backgrounds in the physical or natural sciences. Those classified as technicians work as inspectors, many of whom are located in the field offices. The laboratory technicians perform analysis work for the program. Neither of these positions requires a college degree. The "other" category is comprised of clerical personnel but also includes draftpersons, an accountant, an information specialist and maintenance personnel.

TABLE XIII

WEST VIRGINIA DEPARTMENT OF NATURAL RESOURCES

Division of Water Resources
Current (1976) Staffing Level

Position	1976
Engineer	24
Chemist	6
Geologist	4
Planner	11
Biologist	2
Laboratory Technician	3
Technician	24
Other	33
TOTAL	107

Program officials have indicated that there are about 275 certified wastewater treatment plant operators in West Virginia, about 85% of whom work in municipal sewage plants and the other 15% in industrial waste treatment. In addition, there are 900 Class I-S operators and about 95 operators-in-training and non-certified operators.

All persons operating a wastewater treatment facility in West Virginia are required to be certified by the state in one of five classifications. The operator qualifications are described as follows:

> Class I-S: Sixth (6th) grade education and at least a minimum of three (3) months experience in the operation of a waste water treatment works or twelve (12) classroom hours of specialized and related training.
>
> Class I: High school diploma or equivalent and one year at a waste water treatment works as an operator in training.
>
> Class II: High school diploma or equivalent and three years of class I or greater works operating experience at a waste water treatment works.

Class III: Fourteen years of education or equivalent and five years of class II or greater works operating experience at a waste water treatment works.

Class IV: Sixteen years of education or equivalent and six years of class III or greater works operating experience at a waste water treatment works.

C. Workforce Projection

Projected growth in the Division of Water Resources is expected to be substantial, about half again as many as are currently working in the program. This works out to be an increase of about nine percent per year over a five year period. This growth rate is considered by program officials to be an optimum rate, based on the assumption by the state of the construction grants review and NPDES delegation from EPA. Because of this, the bulk of the growth may occur in a single year rather than being spread evenly across all five years as shown in Table XIV.

TABLE XIV

WEST VIRGINIA DEPARTMENT OF NATURAL RESOURCES

Division of Water Resources
Workforce Projections to 1982 (est.)

Position	1976	1977	1978	1979	1980	1981	%/annum turnover (average)	%/annum growth (average)
Engineer	24	27	30	34	38	43	N/A	12%
Chemist	6	7	7	8	9	10	N/A	11%
Geologist	4	5	5	6	7	8	N/A	15%
Planner	11	13	15	17	20	22	N/A	16%
Biologist	2	2	3	4	5	6	N/A	26%
Laboratory Technician	3	3	4	5	6	7	N/A	19%
Technician	24	26	28	29	30	32	N/A	7%
Other	33	33	33	33	36	37	N/A	2%
TOTAL	107	116	125	138	151	165		9%

Increases are expected to occur in all categories with engineers, planners, and technicians to be the highest in demand. Job requirements are not expected to differ over the next five years from current requirements.

Within the State Health Department, the Division of Sanitary Engineering expects only a small projected staff growth in the Sewage Program.

Although an accurate projection of wastewater treatment plant operators was not available, program officials indicated that there will be an increase in the number of operators, possibly at a rate of about 10 percent per year over the next five years.

D. Training and Certification

Training for wastewater personnel in West Virginia is carried on by both the Department of Natural Resources and the Department of Health. Training for Water Resources Division personnel is accomplished through on-the-job training by experienced Division personnel. Training is also provided by by attendance at various courses, seminars, and workshops conducted by EPA and private organizations.

Training courses in specialized wastewater subjects are provided through EPA's Office of Water Programs Operations at the National Training Center in Cincinnati, Ohio. Subjects offered include wastewater treatment technology, control of special pollution problems, and chemical analysis techniques.

The State Department of Health is responsible for coordination of all wastewater plant operator training. This is accomplished by extended courses, short courses, and seminars offered through adult vocational training centers and through the Environmental Health Service.

E. Career Potential

Projections indicate that the potential for careers in wastewater are good in West Virginia. This may not be the case, however, if the state is not delegated the construction grants review and NPDES permit functions. If West Virginia does take on these functions, an increase of 58 positions is anticipated over the next five years. Although most of these will require professionally trained persons with backgrounds in engineering or the natural sciences, opportunities will exist for those who do not have college degrees, e.g., technicians and laboratory technicians.

Some poistions will also be available for trained waste water treatment plant personnel, although exact figures are not available. These persons will likely be technical people with specific operator training provided by the state.

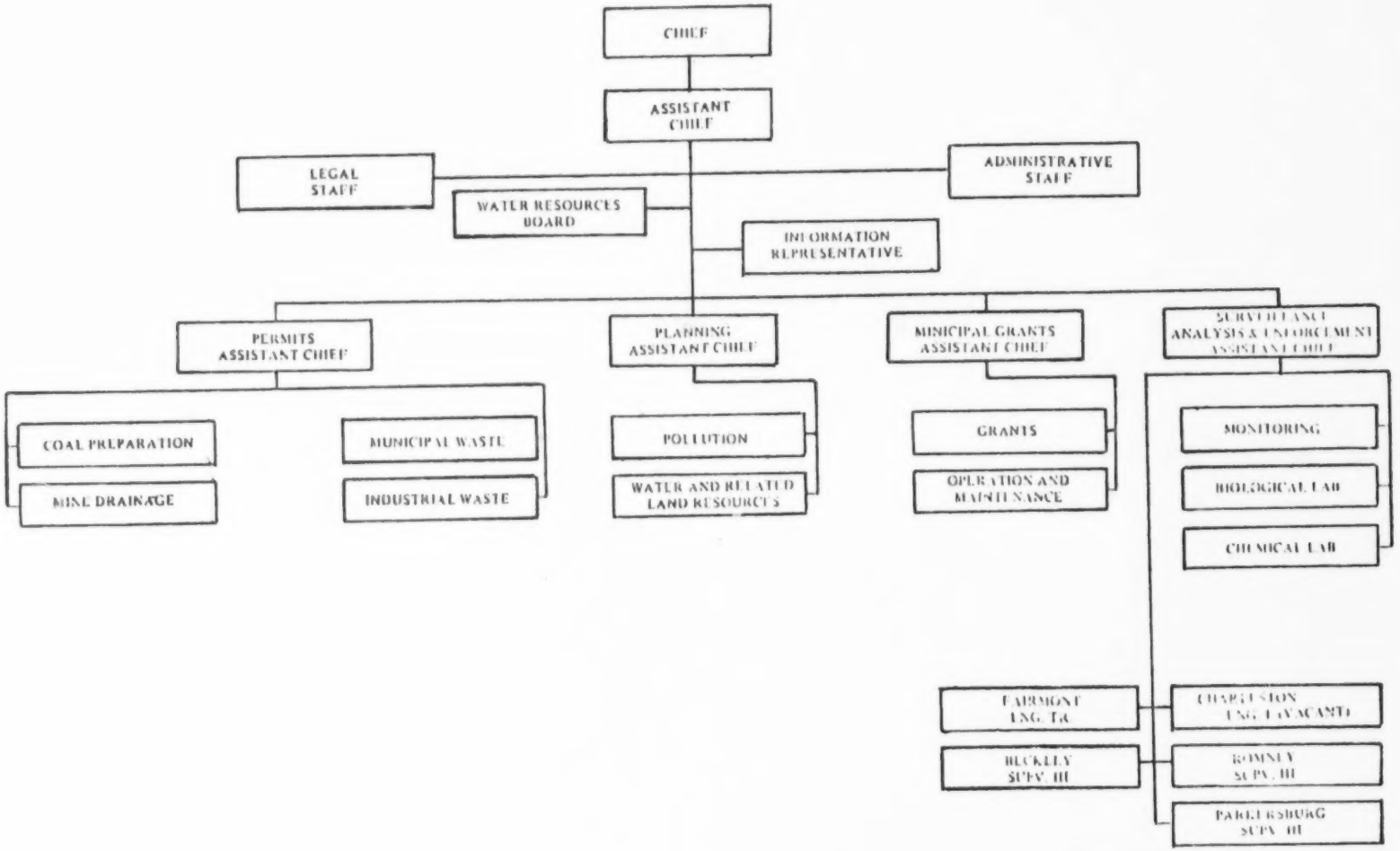
F. Conclusion

The wastewater program in West Virginia is expected to expand considerably over the next few years if the state assumes construction grant review and NPDES permit functions from EPA. Projections indicate that the programs will increase by about nine percent per year over the next five years, with a large demand for engineers, planners, and technicians.

Figure 4

STATE OF WEST VIRGINIA

DIVISION OF WATER RESOURCES



VIII. ENERGY

West Virginia is second to Kentucky in bituminous coal production. The more than 100 million tons produced annually account for 17 percent of the nation's total coal production. The state is the largest producer of natural gas east of the Mississippi River and produces some petroleum. Electrical power is abundant in the Kanawha and Ohio valleys.

West Virginia's economy has long been dependent upon energy production, especially coal. More than 1,000 mines are operating in 34 of the 38 counties. In addition to the extrusive deep mine operations, more than a quarter of a million acres have been strip mined.

The Fuel and Energy Office was established to:

1) provide current information regarding energy availabilty and distribution;

2) act as liaison between citizens, industry and government agencies in the state;

3) promote and implement long and short-term energy conservation program;

4) provide a public information program to citizens on energy conservation;

5) develop educational programs and presentations for schools;

6) recommend energy legislation;

7) forecast possible energy shortages for the state and develop contingency plans; and

8) administer the fuel allocation program.

Any further data and workforce information on the West Virginia energy program was not available at the time of the preparation of this report.

Selected Post Secondary Institutions With Formal Environmental Energy Programs

There are several colleges and universities in West Virginia which offer programs in environmental science and pollution control technology. Information on these programs was gathered from college catalogues selected on the basis of recommendations by professionals in the field, and phone calls to department heads. Only a small percentage of the schools in the state were included in our sample; thus, the programs outlined in this section simply represent the kinds of pollution control training available in the state at the two year, four year, and post graduate college levels. These programs are designed to prepare students for technical or professional positions in pollution control and related areas.

Included in this section are Glenville State College, which offers a program in Environmental Technology leading to an associate in science degree, and Parkersburg Community College, which offers a program leading to a certificate in Environmental Engineering Technology.

SENIOR INSTITUTIONS

Glenville State College
Glenville, West Virginia

Program: Environmental Technology (A.S.)

Hours required for major: Semester - 64
Program Inception: 1975
Staff Size: Two professors, four associate professors (4 Ph.D., 2 M.S.)
Enrollment: 6
Graduates (1976): 1
Placement: 1
Graduate Work: 0

Courses

English
Man and His Environment
Technical Mathematics
General Inorganic Chemistry
Introduction to Environmental Technology
Mechanical Drawing and Drafting
Principles of Economics
Bacteriology
Aquatic Biology
Principles of Sociology
Basic Fortran
Air Quality Analysis
Water Quality Analysis
Reclamation Problems and Techniques
Ecology and Field Biology
Lake, Pond, and Stream Management
Solid Waste Disposal
Environmental Planning and Development

COMMUNITY COLLEGES/TECHNICAL INSTITUTIONS

Parkersburg Community College
Parkersburg, West Virginia

Program: Environmental Engineering Technology (Certificate)

Hours required for major: Semester - 70
Program Inception: 1973
Staff Size: Two part-time instructors (1 M.S., 1 B.S.)
Enrollment: 10
Graduates (1976): 3
Placement: 3
Graduate Work: 0

Courses

Introduction to Environmental Technology
Soil Pollution and Land Management
Environmental Health
Waste Water Treatment
Air Pollution Control
Public Health and Pollution Control Law

State Legislation

WEST VIRGINIA AIR

TITLE:

Air Pollution Control Law
West Virginia Code 16-20

PURPOSE:

To provide for a coordinated statewide program of air pollution prevention, abatement and control and to achieve high levels of air quality.

DEFINITIONS:

1. Person
2. Commission
3. Air pollutants
4. Discharge
5. Statutory air pollution
6. Director

ADMINISTERING AUTHORITY:

Air Pollution Control Commission

AUTHORIZATIONS:

To supervise the regulation of air pollution control in the state;
To conduct studies and research relating to air pollution;
To issue regulations pursuant to the act;
To enter and inspect property in enforcement of the act;
To enforce primary and secondary ambient air quality standards for the state;
To issue enforcement orders;
To act as the state lead agency in air pollution matters.

PROHIBITED ACTS:

To cause or allow a statutory air pollution;
To fail to file any required records;
To construct or modify stationary air pollutant sources without a permit;
To fail to maintain motor vehicle pollution control devices;
To violate other act provisions or regulations.

PENALTIES:

Fines of up to $1,000.

WEST VIRGINIA PESTICIDES

TITLE:

Pesticide Use and Application Act of 1975
West Virginia Code 19-16B

PURPOSE:

To control the use and handling of pesticides through a program of pesticide applicator certification.

DEFINITIONS:

1. Agricultural commodity
2. Animal
3. Certified applicator
4. Commercial applicator
5. Commissioner
6. Defoliant
7. Desiccant
8. Device
9. Direct supervision
10. Environment
11. Fungus
12. Insect
13. Land
14. Licensed applicator
15. Licensed public operator
16. Nematode
17. Permit
18. Person
19. Pest
20. Pesticide
21. Pesticide dealer
22. Plant regulator
23. Private applicator
24. Restricted use pesticide
25. State restricted use pesticide
26. Unreasonable adverse effect on environment
27. Weed

ADMINISTERING AUTHORITY:

Department of Agriculture
Pesticide Advisory Board

AUTHORIZATIONS:

To issue regulations and enforce the act;
To classify pesticides and restrict their usage;
To conduct applicator training courses;

AUTHORIZATIONS (Cont'd)

To enter and inspect property in enforcement of the act;
To regulate the storage and disposal of pesticides;
To license pesticide dealers;
To categorize commercial applicators;
To establish certification standards and certify private and commercial applicators;
To develop a state pesticide plan.

CERTIFICATION OR LICENSING:

License required for engaging in pesticide application business and certificate required for restricted pesticide use;
Examination required in ten categories of applicators established.

PROHIBITED ACTS:

To apply restricted use pesticides without a certificate;
To engage in pesticide application business without license;
To sell restricted use pesticides without dealer license;
To violate the terms of any license or certificate;
To violate other provisions of the act.

PENALTIES:

Initial offense - fines of from $100 to $500;
Subsequent offenses - fines of from $500 to $1,000 or six months imprisonment.

WEST VIRGINIA SOLID WASTE

TITLE:

Roads and Highways Beautification Law
West Virginia Code 17-23

PURPOSE:

To control disposal or other junkyard operations near public highways.

DEFINITIONS:

1. Salvage
2. Salvage yard
3. Fence
4. Owner or operator
5. Commissioner

ADMINISTERING AUTHORITY:

State Road Commission

AUTHORIZATIONS:

To license and control salvage yard operations;
To issue regulations pursuant to the act;
To enforce the act.

PROHIBITED ACTS:

To operate a salvage yard without a license;
To operate a salvage yard within 1,000 feet of road system;
To fail to screen or fence existing operations near roads;
To violate other act provisions.

PENALTIES:

Fines of from $100 to $1,000.

WEST VIRGINIA SOLID WASTE

TITLE:

Solid Waste Disposal Law
West Virginia Code 20-4

PURPOSE:

To provide for the control of litter disposal and the practices of landfill operators.

DEFINITIONS:

1. Other wastes

ADMINISTERING AUTHORITY:

Department of Natural Resources

AUTHORIZATIONS:

To control the cleanliness of highways, roads and other public areas;
To make recommendations concerning highway beautification;
To issue permits for disposal systems and discharge operations;
To approve landfill land reclamation projects.

PROHIBITED ACTS:

To deposit or discard garbage and other refuse in public area or near property of another;
To construct, alter or operate discharge systems without permit;
To fail to submit plans for and undertake landfill land reclamation projects.

PENALTIES:

Litter violations - fines of from $20 to $500 or six months imprisonment.

WEST VIRGINIA WASTE WATER

TITLE:

Water Pollution Control Act
West Virginia Code 20-5A

PURPOSE:

To maintain reasonable standards of purity and quality of waters of the state consistent with public health and enjoyment thereof.

DEFINITIONS:

1. Director
2. Board
3. Chief
4. Person
5. Water resources
6. Pollution
7. Sewage
8. Industrial waste
9. Other wastes
10. Establishment
11. Sewer system
12. Treatment works
13. Disposal system
14. Outlet
15. Activity
16. Disposal well
17. Well
18. Code

ADMINISTERING AUTHORITY:

Department of Natural Resources
Division of Water Resources

AUTHORIZATIONS:

To encourage cooperation with water pollution control measures;
To conduct studies and investigations relating to water pollution;
To monitor water quality;
To develop water pollution control programs;
To approve plans and issue permits for new disposal construction;
To issue regulations pursuant to the act;

AUTHORIZATIONS (Cont'd):

To adopt water quality standards;
To issue pollution abatement orders.

PROHIBITED ACTS:

To allow sewage or other pollution discharge without a permit;
To dispose of solid waste from mine operations without a permit;
To violate the terms of any permit;
To violate other act provisions.

PENALTIES:

Criminal - fines of from $100 to $1,000 or six months imprisonment;
Willful - fines of from $1,000 to $10,000 or six months imprisonment;
Liability also imposed for damage caused to game - fish and aquatic life.